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CLAIMS

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[Claim(s)]

[Claim 1] The panel ID recognition section which is host equipment which transmits a picture signal to two or more connected panels, and recognizes the panel ID which made one unit respectively the singular panel or the collected panel of a predetermined number, The window ID allocation section which assigns a window ID respectively to the window which is the transfer batch of said picture signal, The control signal output section which outputs the control signal for setting up said window ID which should be processed to said panel ID used as a read-out object on the occasion of a transfer of said picture signal, Host equipment characterized by having the picture signal transfer section which adds said window ID assigned by said window ID allocation section to said picture signal, and transmits it.

[Claim 2] Said control signal output section is host equipment according to claim 1 characterized by outputting the setting information on the processing space which is the information about the display area which should be processed for every unit which has said panel ID, and two or more selected units of every.

[Claim 3] Said setting information outputted by said control signal output section is host equipment according to claim 2 characterized by giving a clearance to the termination coordinate and initiation coordinate of processing space in an adjoining panel.

[Claim 4] It is host equipment according to claim 1 characterized by outputting the control signal which shows the panel attribute which it had further the panel attribute setting section which sets up a panel attribute for said every panel ID, and said control signal output section specified said panel ID, and was set up by said panel attribute setting section.

[Claim 5] Said picture signal transfer section is host equipment according to claim 1 characterized by packet-izing an updating picture signal at the time of the need for updating, and adding and transmitting said window ID while managing renewal of a screen for said every window.

[Claim 6] It is host equipment according to claim 1 which is further equipped with the panel ID setup instruction section which directs a setup of Panel ID to said panel, and is characterized by said panel ID recognition section recognizing said panel ID from the information outputted from said panel based on directions by said panel ID setup instruction section.

[Claim 7] It is host equipment which transmits a picture signal to the connected highly minute panel. The panel ID recognition section which recognizes the panel ID which made one unit respectively the singular sub panel concerned or the sub panel concerned of the collected predetermined number supposing the sub panel which divided said highly minute panel into the predetermined number, The window ID allocation section which assigns a window ID respectively to the window which is the transfer batch of said picture signal, The control signal output section which outputs the control signal for setting up said window ID which should be processed to said

panel ID used as a read-out object on the occasion of a transfer of said picture signal, Host equipment characterized by having the picture signal transfer section which adds said window ID assigned by said window ID allocation section to said picture signal, and transmits it.

[Claim 8] Said control signal output section is host equipment according to claim 7 characterized by outputting the setting information on the processing space which is the information about the display area which should be processed for every unit which has said panel ID.

[Claim 9] Said picture signal transfer section is host equipment according to claim 7 characterized by packet-izing an updating picture signal at the time of the need for updating, and adding and transmitting said window ID while managing renewal of a screen for said every window.

[Claim 10] It is host equipment according to claim 7 which is further equipped with the panel ID setup instruction section which directs a setup of Panel ID for said every sub panel, and is characterized by said panel ID recognition section recognizing said panel ID from the information outputted from said highly minute panel based on directions by said panel ID setup instruction section.

[Claim 11] A panel ID setting means to be the image display device which is connected to the host equipment which transmits a picture signal, and displays an image by two or more panels, and to set up the panel ID which is an identifier for every singular panel or panel of the collected predetermined number, A recognition means to recognize the correspondence relation between said panel ID and the window ID concerned which should be processed to the window ID which is the transfer batch of a picture signal and which was assigned for every window, A receiving means to receive said window ID added to the picture signal transmitted, The image display device characterized by the panel which has the panel ID which corresponds the picture signal with which the specific window ID which received with the preparation and said receiving means was assigned based on the correspondence relation recognized by said recognition means processing.

[Claim 12] The image display device according to claim 11 characterized by having a panel control bit for making the condition of two or more panels recognize to said host equipment.

[Claim 13] Said panel is an image display device according to claim 11 characterized by having two or more processing units to which each can process a single window.

[Claim 14] It is the image display device which is connected to the host equipment which transmits a picture signal, and displays an image on a panel. A panel ID setting means to set up the panel ID which is an identifier supposing the sub panel which divided said panel into the predetermined number for every singular sub panel concerned or sub panel concerned of the collected predetermined number, A recognition means to recognize the correspondence relation between said panel ID and the window ID concerned which should be processed to the window ID which is the transfer batch of a picture signal and which was assigned for every window, A receiving means to receive said window ID added to the picture signal transmitted, The image display device characterized by the sub panel which has the panel ID which corresponds the picture signal with which the specific window ID which received with the preparation and said receiving means was assigned based on the correspondence relation recognized by said recognition means processing.

[Claim 15] The image display device according to claim 14 characterized by having a panel control bit for making the condition of said sub panel recognize to said host equipment.

[Claim 16] Said sub panel is an image display device according to claim 14 characterized by having two or more processing units to which each can process a single window.

[Claim 17] The image display device according to claim 14 characterized by having the only memory which stores the setting information on the sub panel set up by said panel ID setting means.

[Claim 18] It is the image display system equipped with the display which consists of two or more panels connected to the host who performs application, and the host concerned. Two or more panels in said display are equipped with the panel ID as an identifier. Said host As opposed to the window which is the field which is collected on the image space which the host concerned is conscious of, and has semantics The image display system characterized by outputting the

control signal which matches a window ID and said panel ID concerned while assigning a window ID to each window, adding the window ID concerned to a picture signal and outputting to said display.

[Claim 19] The image display system according to claim 18 characterized by performing processing which develops said picture signal before the image expansion which packet-ized the picture signal before image expansion, outputted it in said host, and was outputted on said display by said each panel.

[Claim 20] It is the image display approach which displays an image to a display based on the signal from the host who performs application. The panel ID for identifying the display concerned of the predetermined number which forms a singular display or singular tiling concerned to two or more displays which constitute said display is set up. While defining a window as a field which is collected on the image space which said host is conscious of, and has semantics The image display approach characterized by assigning a window ID to the window concerned, setting the window ID which should be processed to said display to which said panel ID was set in advance of a transfer of image information, and adding and transmitting said window ID to said image information.

[Claim 21] Said display which said display is an expansion panel using two or more panels, and constitutes the display concerned is the image display approach according to claim 20 characterized by being the panel concerned which constitutes the expansion panel concerned.

[Claim 22] Said display which said display is the highly minute display panel of a simple substance, and constitutes the display concerned is the image display approach according to claim 20 characterized by being a sub panel for dividing and processing the highly minute display panel concerned.

[Claim 23] The image display approach according to claim 20 characterized by performing modification of said window ID which modification of said panel ID or said display should process by the command from said host to said display.

[Claim 24] All the displays of the predetermined number which forms said tiling are the image display approaches according to claim 20 characterized by setting said common window ID altogether while the common panel ID is set up.

[Claim 25] While setting up the panel ID for identifying the display panel concerned to the display panel which consists of plurality connected to the host who performs application It is the panel attribute read-out approach for reading the attribute of the display panel concerned by the host concerned. To a power up Set said panel ID as 0 to all display panels, and the attribute information over a specific display panel is read by said host. To said display panel which read attribute information, set up said panel ID using a command in addition to zero, and the display panel whose panel ID is 0 The display panel it forbids sending said command from a host to a down-stream display panel, and Panel ID is [ display panel ] except zero is the panel attribute read-out approach characterized by choosing one from two or more display panels which connected with the downstream, and transmitting attribute information to said host.

[Claim 26] The display panel which has panels ID other than said zero is the panel attribute read-out approach according to claim 25 characterized by choosing the display panel which has outputted 0 to the very first, and transmitting said attribute information to said host.

[Claim 27] The panel attribute read-out approach according to claim 25 characterized by choosing one downstream display panel according to the priority currently fixed with said display panel, and transmitting said attribute information to said host when 0 is outputted to coincidence from two or more downstream display panels to the display panel which has panels ID other than said zero.

[Claim 28] The command from said host who attribute information is transmitted from the display panel nearest to said host out of the display panel concerned by which tiling is carried out, and sets up Panel ID when tiling of two or more display panels is carried out is the panel attribute read-out approach according to claim 25 characterized by being sent to all the display panels by which tiling is carried out, without being blocked.

[Claim 29] It is the panel attribute read-out approach according to claim 25 characterized by for said display panel being a sub panel which divided the single highly minute panel into plurality,

and reading the attribute corresponding to the sub panel concerned while said panel ID is set up corresponding to said sub panel.

[Claim 30] Are the image display control approach for controlling two or more display panels connected to the host who performs application, set up the panel ID for identifying said display panel, and said host specifies the specific panel ID. Said display panel which published the command for checking that operation is under continuation to the display panel which has the panel ID concerned, and was specified by said panel ID The image display control approach characterized by replying to read-out of said host using the bit which shows an active thing.

[Claim 31] The image display control approach according to claim 30 characterized by activating a bit for the display panel concerned notifying it, and replying to said host when the newly added display panel exists.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the drive approach for driving two or more display panels and highly minute panels, a driving gear, a display, etc. in more detail about the video interface device at the time of displaying an image on a display panel.

[0002]

[Description of the Prior Art] In recent years, two or more display panels are connected to a personal computer (PC), and the technique used as a display which becomes one big screen as a whole is proposed. At this time, by the usual interface specification, in order to transmit an image, one graphics controller is needed to one set of a display. For example, when it is going to display a separate image on four display panels, four video chips are needed. Therefore, even if it was going to display many display panels under the usual interface, the number of the graphics controllers which can be mounted, i.e., the number of connectable display units, had a limit, and only 4 – 8 panel extent could be connected at the maximum, but there was a limitation also in the escape of a display panel naturally.

[0003] Moreover, own highly minute-ization of a panel progresses and the QXGA (Quad Extended Graphics Array) panel (2048x1536 dots) which is a high definition (overly highly minute), and the QUXGA (Quad Ultra Extended Graphics Array) panel (3200x2400 dots) are being put in practical use in recent years. However, the present condition is it being impossible to follow system power and the power of a graphics chip to the advance of a panel, and overly being unable to perform sufficient display by the highly minute panel. For that reason, how to equip a display side with memory as a means to cancel the lack of power of this graphics chip, and to reduce a transfer rate to a realizable transfer rate technically is considered, but the movie display for which a high-speed transfer rate is needed cannot be coped with. On the other hand, although how to carry out division processing with two or more drives could be considered while dividing and carrying out the screen as correspondence of this highly-minute-izing,

processing equivalent to two or more panels existing also in this case, though it is one panel was required of the host, and the escape of processing was difficult by the same reason as connection of above-mentioned two or more panels.

[0004] In order to solve such a technical problem, the applicant has proposed in Japanese Patent Application No. No. 164354 [ 11 to ] about the technique which connects a display panel continuously. This technique is a technique of realizing a multi-panel in the shape of a daisy chain by adding a control signal after the information on lowest Rhine in a picture signal. According to this technique, the enlarged display by two or more display units in which chain connection was made by modification of simple software becomes possible, without changing the hardware by the side of a system.

[0005]

[Problem(s) to be Solved by the Invention] On the other hand, in this Japanese Patent Application No. No. 164354 [ 11 to ], the control signal is sent out from the host side via the picture signal line to each panel. Therefore, if its attention is paid only to a host side, the processing which was comparatively strongly conscious of the screen being divided into plurality may be needed. Moreover, when its attention is paid only to the chain connection in the above-mentioned application, the technical technical problem is left behind also to signal degradation by the junction of each panel.

[0006] Moreover, while the number of connection panels had a limit, when it was going to realize the multi-panel environment with the above-mentioned conventional technique, it was difficult to perform the same operation with the number of connection panels. That is, even if it was going to realize the multi-panel, the number and connection have a big limit, and application of a free multi-panel was not able to be performed.

[0007] This invention has the place which it is made in order to solve the above technical technical problems, and is made into the purpose in making possible the same operation by the number of connection panels also in the bottom of a multi-panel environment. Moreover, with the conventional technique, other purposes make multi-panel connection of the shape of a tree which was not able to be solved, and are to enable the re-layout of a dynamic panel. It is in making it possible to treat the panel with which it covered as one big panel, or to more specifically display the duplicate of the same information, after dividing.

[0008] Furthermore, other purposes are to constitute a multi-panel from a system automatically, without reading a display attribute from a cascade or the multi-panel by which tree connection was made, and performing a setup special to each display unit. Furthermore, other purposes are to enable processing which he makes it be in sight as an indicating equipment of a simple substance from a host, and is not conscious of a multi-panel because the drive used as a master controls each drive, when carrying out division processing of the panel of a super-high definition with two or more drives.

[0009]

[Means for Solving the Problem] The panel ID recognition section which the basis of this purpose and this invention are host equipment which transmits a picture signal to two or more connected panels, and recognizes the panel ID which made one unit respectively the singular panel or the collected panel of a predetermined number, The window ID allocation section which assigns a window ID respectively to the window which is the transfer batch of this picture signal, The control signal output section which outputs the control signal for setting up the window ID which should be processed to the panel ID used as a read-out object on the occasion of a transfer of a picture signal, It is characterized by having the picture signal transfer section which adds the window ID assigned by this window ID allocation section to a picture signal, and transmits it.

[0010] Moreover, this invention is host equipment which transmits a picture signal to the connected highly minute panel, and is characterized by having the panel ID recognition section which recognizes the panel ID which made one unit respectively the singular sub panel or the collected sub panel of a predetermined number supposing the sub panel which divided this highly minute panel into the predetermined number.

[0011] Here , this control signal output section become possible [ match with the location of the

arbitration on image space / in / for the description , then a screen display / in output the setting information on the processing space which be the information about the display area which should be process for every unit which have Panel ID , and two or more selected units of every / host equipment ] . More specifically sending the command which changes the zero of the processing space in each panel (sub panel) to a panel (sub panel) is mentioned. In addition, the so-called update information for the setting information on this processing space to change the image space which should be processed besides initial setting is also included. Here, as two or more selected units of every, it is realizable by promising that it is said that the command to panel ID:0 is broadcasting to all panels, for example. For example, as what is published to coincidence to two or more panels, all panels can be changed into a non-display condition (deep-black) by one command, or it can consider making it return to a display condition etc. Moreover, when controlling the multi-panel which covered with two or more panels, setting information outputted by the control signal output section can be characterized by giving a clearance to the termination coordinate and initiation coordinate of processing space in an adjoining panel. More specifically in consideration of the discontinuous field by the frame of each panel, making about 10 bits and a coordinate offset is mentioned. According to this, even if it is the case where covered with two or more panels and discontinuity arises, it becomes possible to stop gap of an image to the user who looks at a screen to the minimum.

[0012] Moreover, it can have further the panel attribute setting section which sets up a panel attribute for every panel ID, and the control signal output section can be characterized by outputting the control signal which shows the panel attribute which specified Panel ID and was set up by the panel attribute setting section. As attribute information, they are the brightness of a panel, a gamma setup, color adjustment including a color temperature property, etc. By this configuration, host equipment can specify the target panel and can perform renewal of a panel attribute etc. Furthermore, the picture signal transfer section can packet-ize an updating picture signal at the time of the need for updating, and can be characterized by adding and transmitting this window ID while it manages renewal of a screen for every window. At this time, control information, such as a window location on a screen and magnitude, is also added, and it can send. Moreover, it can have further the panel ID setup instruction section which directs a setup of Panel ID to a panel (sub panel), and the panel ID recognition section can be characterized by recognizing Panel ID from the information outputted from a panel (sub panel) based on directions by this panel ID setup instruction section. In addition, these processings of each may be performed by software, and a card may be given about a part of functions, and the remaining function may be performed by software. That is, the means of whether hardware attains as modes, such as host equipment, or software attains is not chosen.

[0013] It is the image display device which this invention is connected to the host equipment which transmits a picture signal on the other hand, and displays an image by two or more panels. A panel ID setting means to set up the panel ID which is an identifier for every singular panel or panel of the collected predetermined number, A recognition means to recognize the correspondence relation between Panel ID and the window ID which should be processed to the window ID which is the transfer batch of a picture signal and which was assigned for every window, It has a receiving means to receive the window ID added to the picture signal transmitted. It is characterized by the panel which has the panel ID which corresponds the picture signal with which the specific window ID which received with this receiving means was assigned based on the correspondence relation recognized by the recognition means processing.

[0014] When an image display device is the set of a sub panel which divided the highly minute panel etc. here The sub panel which divided the panel into the predetermined number is assumed. For every singular sub panel or sub panel of the collected predetermined number The picture signal with which the specific window ID which was equipped with a panel ID setting means to set up the panel ID which is an identifier, and received with the receiving means was assigned It can be characterized by the sub panel which has the panel ID which corresponds based on the correspondence relation recognized by the recognition means processing.

[0015] Moreover, it becomes possible to grasp the tiling condition of assuming two or more panels to be one big virtual panel with the description, then host equipment for having had the

panel control bit for making the condition of two or more panels recognizing to host equipment etc. The tiling bit which memorizes whether tiling is carried out as this panel control bit, for example, the tile master bit which shows that it is the panel which communicates with host equipment as a representative of a virtual panel, the tile last bit which shows that it is the last panel of the connected tiling configuration panel, the bit which shows that relocation is received as a multi-panel configuration are mentioned.

[0016] Furthermore, a panel (sub panel) can be characterized by having two or more processing units (for example, handler) to which each can process a single window. If this handler is constituted so that it may have the priority information which shows vertical relation when the window other than the window ID which should be processed laps, it is desirable at the point that expansion of the image in an image display device can be performed appropriately. As for the number of these handlers, it is desirable that optimization is attained in consideration of the number of windows with the need of processing to coincidence.

[0017] Moreover, when divided [ overly ] into the sub panel in a highly minute panel, it can constitute so that a display may be equipped with the only memory which stores the setting information on the sub panel set up by the panel ID setting means of a sub panel. In this case, two or more processing chips which drive each sub panel, for example are prepared for every sub panel, and the mode which controls this processing chip is mentioned.

[0018] as the image display system equipped with the display on which this invention consists of two or more panels connected to the host who performs application, and this host on the other hand -- \*\*\*\*\* -- things are made. In this case, while equipping two or more panels in a display with the panel ID as an identifier, assigning a window ID to each window to the window which is the field which a host's settles on the image space which this host is conscious of, and has semantics, adding this window ID to a picture signal and outputting to a display, it can be characterized by outputting the control signal which matches a window ID and Panel ID. Especially, in this host, the picture signal before image expansion is packet-ized, and is outputted, and it excels in the point that the description then optimization of a workload [ in / for performing processing which develops the picture signal before the outputted image expansion by each panel / each module ], and improvement in the throughput as the whole system can be aimed at, on this display. In addition, two or more of these panels are used as one highly minute panel, and it is satisfactory even if it grasps invention as a sub panel which divided this highly minute panel for each panel.

[0019] On the other hand, a category is changed. This invention moreover, \*\*\*\*\* and this invention It is the image display approach which displays an image to a display based on the signal from the host who performs application. The panel ID for identifying the display of the predetermined number which forms a singular display or singular tiling to two or more displays which constitute a display is set up. While defining a window as a field which is collected on the image space which this host is conscious of, and has semantics A window ID can be assigned to this window, the window ID which should be processed to the display to which Panel ID was set can be set in advance of a transfer of image information, and it can be characterized by adding and transmitting a window ID to image information. In addition, this display is an expansion panel using two or more panels, and the display which constitutes a display can be characterized by being the panel which constitutes this expansion panel. Moreover, a display is the highly minute display panel of a simple substance, and the display which constitutes a display can also be characterized by being a sub panel for dividing and processing this highly minute display panel.

[0020] Here, it can be characterized by for modification of Panel ID or a display processing from a host to a display, for example, performing modification of the window ID in the above-mentioned handler by the command. In addition, it is possible to perform modification of a panel attribute etc. by the command. The host who sent this command can constitute so that the error information of the video data transmitted from the display etc. may be read. In addition, all the displays of the predetermined number which forms tiling are desirable at the point that an enlarged display etc. can be performed using the display of a predetermined number while they can treat the display of the predetermined number by which tiling was carried out [ that the common window ID is set altogether and ] from the description, then host side while the common



panel ID was set up as one panel.

[0021] On the other hand, if this invention is grasped from other viewpoints, while setting up the panel ID for identifying a display panel to the display panel which consists of plurality connected to the host who performs application It is the panel attribute read-out approach for reading the attribute of a display panel by the host. To a power up Set Panel ID as 0 to all display panels, and the attribute information over a specific display panel is read by the host. To the display panel which read attribute information, set up Panel ID using a command in addition to zero, and the display panel whose panel ID is 0 It can forbid sending said command from a host to a downstream display panel, and the display panel Panel ID is [ display panel ] except zero can be characterized by choosing one from two or more display panels connected to the downstream, and transmitting attribute information to a host. According to this panel attribute read-out approach, after defining Panel ID from the beginning, and it becoming unnecessary to memorize each attribute and performing addition of a panel, deletion, etc., it excels in the point that Panel ID can be set up dynamically, very much.

[0022] Moreover, the display panel which has panels ID other than this zero can be characterized by choosing the display panel which has outputted 0 to the very first, and transmitting attribute information to said host. Furthermore, when 0 is outputted to coincidence from two or more downstream display panels to the display panel which has panels ID other than this zero, it can be characterized by choosing one downstream display panel according to the priority currently fixed with the display panel, and transmitting attribute information to a host.

[0023] Furthermore, when tiling of two or more display panels is carried out, the command from the host who attribute information is transmitted from the display panel nearest to a host out of the display panel by which tiling is carried out, and sets up Panel ID is desirable at the point which can give the same panel ID for being sent to all the display panels by which tiling is carried out dynamically to the description, then the panel by which tiling is carried out, without being blocked. In addition, this display panel is a sub panel which divided the single highly minute panel into plurality, and Panel ID can also be characterized by reading the attribute corresponding to this sub panel while it is set up corresponding to this sub panel.

[0024] It is the image display control approach for controlling two or more display panels connected to \*\*\*\*\* and the host who performs application in this invention from other viewpoints on the other hand. The panel ID for identifying this display panel is set up. A host The display panel which specified the specific panel ID, published the command for checking that operation is under continuation to the display panel which has Panel ID, and was specified by Panel ID It can be characterized by replying to read-out of a host using the bit which shows an active thing. According to this configuration, by the host side, the connection confirm to a specific display panel can be performed easily. Here, the display panel which is not specified may be constituted so that it may transmit only pouring the read-out data from a lower stream of a river to an upstream host side, and taking an OR to a host side. Furthermore, it excels activating a bit for a display panel notifying it and replying to a host, when the newly added display panel exists in the point which becomes able [ a host ] to grasp existence of the description, then the added display panel simply. It can constitute so that it may transmit to a host side also at this time, taking an OR with each display panel.

[0025]

[Embodiment of the Invention] Drawing 1 is the block diagram showing 1 operation gestalt of the image display system by which this invention was applied. In drawing 1 R> 1, a sign 10 is a host (HOST) who consists of a personal computer (PC) etc., and has a role of a driving gear for driving the display in the gestalt of this operation. In this host 10, the I/O circuit where a sign 12 consists of a keyboard, a mouse, etc., and 13 are RAM which consists of a hard disk with which data, such as a video signal, were memorized, a dynamic RAM, etc. The video signal used for a display may be constituted so that the video signal generated by the equipment of the exterior besides in the case of being created by host 10 self in the gestalt of this operation etc. may be incorporated. Moreover, 11 is CPU and is performing a host's 10 executive operation based on a control program, directions by the user from the I/O circuit 12, etc.

[0026] Furthermore, a sign 15 is performing various control to the connected panel 30 while

being controlled by \*\* and CPU11 in a display-control circuit. This display-control circuit 15 is equipped with the panel ID setup instruction section 21, the panel ID recognition section 22, the panel attribute setting section 23, the control signal output section 24, the window ID allocation section 25, the picture signal transfer section 26, and the image generation section 27. This panel ID setup instruction section 21 has the function it is directed that sets up Panel ID to a panel 30 for example, immediately after powering on. Moreover, in the panel ID recognition section 22, the panel ID which the panel ID setup instruction section 21 assigned to two or more panels 30 is recognized, and when the panel attribute setting section 23 and the control signal output section 24 control each panel, Panel ID is offered. Moreover, in the panel attribute setting section 23, the panel was specified by Panel ID and panel attributes, such as brightness control and gamma adjustment, are set up. Furthermore, in the control signal output section 24, the control signal for setting up the window ID which should be processed to Panel ID is outputted. This output is outputted to the handler mentioned later. Furthermore, a unique window ID is assigned to each window in the window ID allocation section 25. The picture signal transfer section 26 read and packet-ized the picture signal stored in RAM13, gave the window ID, and has transmitted the picture signal to a panel 30. Moreover, the image generation section 27 is performing graphics drawing which forms the image itself based on the data stored in RAM13. [0027] on the other hand -- a sign 30 -- as an indicating equipment -- liquid crystal display display (LCD) etc. -- from -- although it is the becoming panel, further two or more panels 30 are connected to the downstream of this panel 30 a cascade and in the shape of a tree, for example, a big screen is formed combining two or more panels 30. This panel 30 can also be grasped here as a sub panel which divided the highly minute panel into plurality. In that case, it becomes one panel as an object (physically) including two or more panels 30 (sub panel) connected to the downstream. Each panel 30 is processed by the processing chip 31. The frame memory (not shown) is contained in this processing chip 31, and it has the information (the example of drawing 1 (0 0) - (3999 2999)) about the display area which oneself should process. Thereby, the processing chip 31 is constituted so that processing of only the field in the information may be performed. Moreover, the processing chip 31 is equipped with nonvolatile memory 32, and information required for a panel setup of processing space etc., the resetting information in a multi-panel, the attribute information on the panel known as EDID (Extended Display Identification Data), etc. are stored in this nonvolatile memory 32. However, when a panel 30 corresponds to one of the sub panels of a highly minute panel, if only one connects with the processing chip 31 of a master first connected to a host 10, it is sufficient for nonvolatile memory 32, and it needs to equip no sub panels with nonvolatile memory 32. In this case, it has the processing chip 31 as a drive in each sub panel, and each active parameter becomes with the mode stored in the single nonvolatile memory 32. Moreover, each panel 30 is equipped with the receiver 33 which receives the packet-ized picture signal (image data) from a host 10, and the driver 34 for sending a picture signal to the following panel 30 at the time of a multi-panel configuration.

[0028] The picture signal transmitted from a host's 10 picture signal transfer section 26 is received by the receiver 33, and the contents are sent to the processing chip 31. Information interchange with a host 10 is equipped with the interface of 12C base known as DDC (Display Data Channel), and it is constituted so that a control signal may go back and forth between a host 10 and panels 30 through this interface. The received picture signal is sent to the panel 30 of the downstream by the driver 34. It and coincidence are equipped with DDC turned down-stream from the processing chip 31 in order to connect DDC with a host 10 to the panel 30 of the downstream.

[0029] One of the parameters used as the important point of the division drive of a screen in the gestalt of this operation is a setup of processing space. In drawing 1, the number of pixels of a panel 30 presupposes that it was 4000 pixels of horizontal directions, and was 3000 pixels perpendicularly. When using a panel 30 alone at this time, it is common to make the pixel of (0, 0), and a lower right edge the pixel of the upper left edge of a screen correspond to a host's 10 image space as (3999, 2999). However, it becomes possible to match processing space with the location of the arbitration on a host's 10 image space by rewriting the configuration information

of nonvolatile memory 32, using the command via DDC.

[0030] Moreover, in order to connect two or more panels 30 the shape of a cascade, and in the shape of a tree, with the gestalt of this operation, it has one or more outputs to a lower stream of a river as mentioned above. A picture signal and DDC for the communication link with a host 10 are included in each output. The picture signal outputted has the same contents as the inputted information. Moreover, with the gestalt of this operation, when data are sent from a host 10, fundamentally, a DDC output is outputting the inputted copy of the contents, and is passing information to coincidence to all the connection panels 30. On the other hand, with the directions from a host 10, when sending various kinds of information, such as the panel ID mentioned later, for example, to a host 10 from a panel 30 side, two or more panels 30 will send data towards the upstream (direction near a host 10). Here, at the time of read-out of EDID information, one input is chosen in the input from the panel 30 connected to each panel 30 two or more sets, corresponding to informational contents. Moreover, as informational contents, at the time of read-out of error information, it is constituted so that processing in which it transmits to the upstream, carrying out logic processing of the input from two or more sets (OR etc.), and totaling information can be performed.

[0031] The panel 30 in the gestalt of this operation carries out arranging, as it covered with two or more panels 30 besides in the case of being recognized as one set of a display from a host 10 by it one set, for example etc., and may be made to recognize as one set of a display to a host 10 here. As a characteristic configuration, each panel 30 consists of gestalten of this operation so that it may have the identifier called Panel ID (Panel-ID). Immediately after switching on a power source, Panel ID is 0. If a host's 10 panel ID setup instruction section 21 receives directions of ID setup, ID then set up will serve as an identifier of each panel 30. The panel ID recognition section 22 in a host 10 recognizes the panel ID which each panel 30 had via the panel 30 of the upstream most. Moreover, in the panel attribute setting section 23 in a host 10, using the panel ID which each panel 30 has, the target panel 30 is specified and it becomes possible to perform renewal of the attributes (brightness, gamma setup, etc.) of a panel 30 etc.

[0032] It becomes possible to express an operating space which was covered with many panels by changing the image space where Panel ID is specified and the specified panel 30 processes it from a host 10 on the other hand. The change command from a host 10 is used for this modification, and the multi-KONFU (MultiConf) bit which shows that modification was received, and the coordinate of the new space after modification are stored in nonvolatile memory 32. By this, the display of the space can be resumed at the time of a next system startup. When one panel 30 is driving with two or more chips (chip for processing) at this time, it is necessary to set up processing space for every sub panel applicable to the display area which those chips should process themselves. The thing which made the amount of [ as a panel 30 ] space modification act at the processing space information on the sub panel stored in the nonvolatile memory 32 of each panel 30 in this case will be sent to each sub panel.

[0033] When it constitutes a multi-panel as mentioned above, a host 10 will manage the panel 30 for number of sheets. Even if it only treats as one panel 30 under the environment arranged fixed, in not interfering, the technique called tiling enables it to show it as the panel 30 of a simple substance at a host 10. When considering as one big virtual panel combining two or more panels 30 by this tiling, each panel 30 which forms that component consisted of gestalten of this operation so that it might have the common panel ID. Thus, with constituting, it can be considered from a host 10 that this virtual panel is one panel 30. Tiling is realized by the control information which it has the common panel ID when regarded as the display of one sheet by such tiling, and also is mentioned later. In addition, these processings of each may be performed by software, and a card may be given about a part of functions, and the remaining function may be performed by software.

[0034] Drawing 2 shows the example of a configuration of two or more panels containing tiling. Panel A - Panel I are the same configurations as the panel 30 shown in drawing 1. Here, each is recognized as a panel of a simple substance and Panels A and B have common image space (for example, (0 0), - (999,999)). Panels C, D, E, and F form tiling so that it may be regarded as one panel by four sheets. Therefore, image space is constituted so that one big image space can be

set up according to the condition which four panels followed to - (0 0) (1999 1999), respectively, i.e., four panels.

[0035] Moreover, Panels G, H, and I are recognized as a panel of a simple substance, respectively. However, in response to modification of a viewing area, it is directed that the field on the right-hand side of the virtual panels C, D, E, and F can be displayed exactly, and the image space of Panel G is started from (3000, 0) here. Moreover, Panels G, H, and I serve as a space setup which left the clearance in consideration of there being a discontinuous field of about 10 dots by the frame of a panel etc. For example, the termination x-coordinate of Panel G is 3999, and the initiation x-coordinate of the adjoining panel H is constituted so that it may be set to 4010. Similarly, the termination y-coordinate of Panel H is 999, and the y-coordinate of the adjoining panel I is started from 1010. Thus, with the gestalt of this operation, when the display on a screen is not continuously connected by the outer frame of a panel etc. at the time of a setup of this processing space, it consists of giving a clearance to the termination coordinate and initiation coordinate of the adjacent panel so that it may become possible to realize a natural display. Furthermore, there are one or more sets of processors in each panel 30, and it has wiring for transmitting an image to each, and wiring of DDC which exchanges control information.

[0036] Drawing 3 shows the example of a setting of the control information (control parameter) at the time of constituting two or more panels including tiling explained in drawing 2. Module (panel) A-I of drawing 3 is shown that it corresponds to the panel A shown in drawing 2 - Panel I. As control information, others [ panel / ID 45 ], As a representative of the tile (Tiled) bit 41 which memorizes whether tiling is carried out, and a virtual panel the tile master (TiledMaster) bit 42 which shows that it is the panel which communicates with a host 10, and the tile last (TileLast) bit 43 which shows that it is the last panel of the tiling configuration panel which is chain connection, and by which the dee G chain was carried out -- and There is a multi-KONFU (MultiConf) bit 44 which shows that relocation is received as a multi-panel configuration. Each panel 30 will store each bit information in the nonvolatile memory 32 shown in drawing 1, and those bits will be managed by each panel 30.

[0037] Here, since the virtual panels C, D, E, and F are recognized by the host 10 as one panel, the tile bit 41 is set to Y", "1", and has "panel ID:3" with these common panels ID 45. [ i.e., ] In order that Panel C may be located in the head of tiling and may reply from a host 10 to information read-out (for example, EDID information read-out) in this, the tile master bit 42 which shows that it is the representation of a virtual panel is set to Y", "1". [ i.e., ] In order that all other simple substance panels may reply to read-out at this time, the tile master bit 42 is set to Y", "1". [ i.e., ] Moreover, by the panel F which is the last panel of tiling, the tile last bit 43 is set to "Y, "1", ". [ i.e., ]

[0038] Panels G, H, and I are alone dealt with as a panel, and have the separate panels ID 45, such as "4", "5", and "6", respectively. Since the image space to process is changed from the time of a simple substance, the multi-KONFU bit 44 is set to Y", "1". [ i.e., ] When this multi-KONFU bit 44 is "1", the image space for a multi-panel configuration corresponding to not the space of the criterion which set the upper left to (0, 0) but the location of arbitration shall be set up. Also when tiling is carried out, the same parameter for a multi-panel configuration is used. Here, the image space which it was made the tiling configuration, or it treated as a simple substance panel, and considered as the multi-panel configuration, or \*\*\*\*\* and others also covered with the panel can be obtained. However, although there is an ease treated as one panel at the time of tiling, it is one of these and it is possible for there to be a degree of freedom which can change each attribute independently at the time of a multi-panel, and to choose both suitably with application.

[0039] On the other hand, Panels A and B are alone treated as a panel, and have the separate panels ID 45, such as "1" and "2", respectively. And since the multi-panel configuration is not received, as shown in drawing 2, the same image space [ edge / upper left ], such as (0, 0), will be supported fundamentally. Supposing the same window number (after-mentioned) was assigned to the processing unit of Panels A and B at this time, Panels A and B will completely come out of and demarcate the same screen. When outputting this same screen, while carrying out

[ \*\*\*\*\* ] counter business in the bank etc., for example, it is possible that a customer and a bank clerk share the same screen etc.

[0040] Next, the window ID which is the focus in the gestalt of this operation is explained. With the gestalt of this operation, the field which is collected and has semantics on the image space which the host 10 is conscious of is made into the unit of a window, a call, and image data transfer processing. A window is range where processing of the application software on a host 10 attains to coincidence in many cases. The unique window ID is assigned to each window in the host 10. The host 10 managed renewal of a screen for every window, when he had the need for updating, he packet-ized updating data, and he has added and transmitted the window ID. Control information, such as a location of the window on a screen and magnitude, is also added to a packet. Each shall be equipped with two or more processing units which can process one window ID, and the panel 30 shall process two or more windows to coincidence. The number of these units turns into the number of the windows which can be processed to coincidence.

[0041] Drawing 4 is drawing having shown the example of correspondence in the image space of a window ID and Panel ID. A sign 50 is the image space of the system which is the image space which can be displayed by the host 10. Two or more panels 30 are arranged in the image space of this system. Panel ID: The panel 30 which is 1 is alone treated as one panel in one sheet. Panel ID: Tiling of the four panels 30 is carried out, and four panels 30 which are 2 have common panel ID:2. From a host 10, the window ID which should be processed to a panel 30 is set in advance of an image transfer of a window. In drawing 4, it orders through a command to panel ID:1 and panel ID:2 to process the window 51 of window ID:1, and the window 52 of window ID:2. Here, if image information with the window 51 of window ID:1 is transmitted by the packet with window ID information, each panel 30 will perform only access to an own management domain from the range of the window 51, and the display rectangle of each panel 30. The handler (after-mentioned) also has the priority information which shows vertical relation when the window other than a window ID laps.

[0042] Drawing 5 is an explanatory view for explaining the contents of the handler placed into the panel 30. Here, a handler means the processing unit which takes charge of processing of one window, and shows the condition that one panel 30 is equipped with two handlers, for example, by drawing 5. The 1st handler 61 and the 2nd handler 62 presuppose that it is set up so that it may take charge of processing of window ID:1 and window ID:3, respectively. The image data from a host 10 is packet-ized, and the window ID is added to each. When the window ID in a packet judges that it is each window which should be processed, the 1st handler 61 and the 2nd handler 62 perform processing, and update a screen about the operating space of the display 36 in their panel 30. The window of window ID:2 is not processed in a setup of drawing 5. For the reason, a setup of the 1st handler 61 or the 2nd handler 62 is changed suitably, and after specifying that it processes window ID:2, it is constituted so that the packet of window ID:2 may be sent. The number of handlers can be planned in optimization in consideration of the number of windows with the need of processing to coincidence. In addition, when processing one panel 30 with two or more processing chips 31, all the handlers of each processing chip 31 are constituted so that it may have a common window ID. Similarly, when tiling of the panel 30 is carried out, it is constituted so that all the panels 30 that constitute the tiling may have a common window ID.

[0043] Here, in order to make further easy to understand the image transfer mentioned above, the packet transfer in the gestalt of this operation is briefly explained using drawing 6. This drawing 6 is an explanatory view for explaining packet mode of processing outputted to a panel 30 side from a host 10. Now, Field A and Field B shall exist as an image image by the application by the side of a host 10. With the gestalt of this operation, expansion of an image is not performed by the host 10 side, but expansion of an image is performed by the panel 30 side. In a host 10, window ID:5 are set up for window ID:4 to Field B, for example to Field A. A transfer of the image information by the side of a panel 30 is classified for every field, and is performed by the packet method. Corresponding to a display enabling (Display Enable) signal, it is packet-ized for every scan and, more specifically, a picture signal is transmitted. ID information which shows a window ID, respectively is added and transmitted to the picture signal by these packets. For

example, if it is set as each above-mentioned handler in the specific panel 30 so that window ID:4 and window ID:5 may be processed, it will be transmitted by the packet method and it will become possible to develop the image information to which the window ID was given on an assignment panel.

[0044] Next, the command between a host 10 and a display (two or more panels 30) is explained. To two or more panels 30, modification of Panel ID, modification of the window ID in a handler, modification of a panel attribute, etc. are performed by the command from a host 10. A host 10 reads the error information of the video data (Video Data) transmitted from two or more panels 30 etc. With the gestalt of this operation, in order to support a multi-panel, it has the following command.

\*\* Setup of Panel ID: ID of the target panel 30 is changed. Immediately after powering on, since all the panels 30 are panel ID:0, panel ID:0 is changed into ID other than zero.

\*\* Panel zero setup: The display position of the target panel 30 is changed. In the image space 50 of the system in a host 10, it is set as the location of arbitration.

\*\* Window ID setup for handlers: The window ID which each panel 30 processes is set up for every handler.

\*\* Window priority setup for handlers: A priority when the windows which a handler takes charge of overlap is set up.

\*\* Error information read-out of a window: After image data with a certain window ID is transmitted, it reads whether the transfer error occurred. Since a window may straddle two or more chips and a panel, it takes an OR to the result of all chips with the window ID made into the purpose.

\*\* Error information read-out of a panel: In the target panel 30, it reads whether the data transfer error occurred. When tiling is being carried out, suppose that the OR of the error information in all configuration members (panel 30) is read.

\*\* Panel power-source situation read-out: The situation of the target panel 30 of operation is read. The panel 30 added newly also contains the bit which can show an addition.

\*\* Panel configuration information read-out: The configuration information of the panel 30 stored in nonvolatile memory 32 is read.

\*\* Panel configuration information modification: Modification of configuration information, such as tiling, is stored in nonvolatile memory 32.

[0045] Next, read-out of the configuration information (display information) of a panel 30 is explained. Here, drawing 7 - drawing 10 are drawings for explaining a setup of Panel ID and the readout of configuration information by Panels A, B, C, and D in order of a step. In order to read the configuration information (attribute information) of the panel 30 (display unit) to which the host 10 is connected and to perform the optimal setup for operation, the panel 30 has memorized various attributes of a display to nonvolatile memory 32, and has replied from the host 10 to read-out. Although based on the EDID information specified by VESA (Video Electronics Standard Association) with the gestalt of this operation, the following Ruhr and a device are introduced into the bottom of the environment where two or more sets of panels 30 were connected, and read-out of the attribute information from all the panels 30 is made possible.

[0046] The flow of display information read-out is explained using drawing 7 - drawing 10. With the gestalt of this operation, only the panel 30 of panel ID:0 shall have first the right which replies to read-out of attribute information. Therefore, as shown in drawing 7, as for immediately after powering on, all the panels 30 have panel ID:0. The panel 30 with ID other than "0" has achieved the function which chooses one of two or more panels 30 connected down-stream, and is transmitted to the upstream (to host 10 side). After a host 10 reads attribute information, the panel ID of the panel 30 shall be set up by the command in addition to "0." At this time, the panel 30 of ID:0 is forbidding sending the panel ID command from a host 10 to the panel 30 of the downstream, and has prevented that other panels 30 receive a setup of Panel ID carelessly. That is, in drawing 7, on the panel 30 of the downstream of Panel A, a command does not flow until the attribute information in the nonvolatile memory of Panel A is read and Panel A receives a setup of Panel ID. Then, as shown in drawing 8, if it is set as "1" and becomes in addition to

"0", access of the panel ID of Panel A to the panels B and C connected to Panel A will be attained.

[0047] When the panel 30 with panels ID other than "0" chooses one set from among the connected downstream panels 30, the data line of 12 C bus of a serial transmission method is investigated. With the gestalt of this operation, pull-up of the terminal to which the panel 30 is not connected is carried out, and it is designed so that it may always be "1." Therefore, the panel 30 which has outputted "0" to the very first is chosen as a next candidate. In the example shown in drawing 8, Panel B should output "0" previously among the panel B connected to Panel A, and Panel C. Consequently, Panel B is chosen and read-out of the attribute information in nonvolatile memory is performed. Moreover, when "0" is inputted into coincidence from two or more panels 30, it is constituted so that a panel 30 may be chosen according to the priority currently fixed by each panel 30.

[0048] The pass to the selected panel 30 is once held until the command of a panel ID setup is completed. That is, as shown in drawing 8, the path to the panel B chosen by Panel A is held until ID of Panel B is set up. Thus, with constituting, it becomes possible to change alternatively the panel ID of the panel 30 which read attribute information to just before out of the panel 30 of panel ID:0 existing [ much ]. By the setting command of Panel ID, all the selected paths will be canceled and selection of the new non-set up panel 30 will be performed. By drawing 9, after Panel B is set as panel ID:2, the condition that the panel C by which "0" was outputted was chosen by Panel A is shown.

[0049] When tiling of two or more panels 30 is carried out, as for the panel 30 which has the responsibility of sending attribute information to a host 10, the above-mentioned tile master bit is set as "1." The panel 30 located in the place where the distance on the link to a host 10 is the shortest specifically has the responsibility in the panel group by which tiling was carried out, and the tile master bit in Panel C is set as "1" in drawing 9. When tiling is carried out, without blocking the command from the host 10 who sets up Panel ID, it is sent to the panel 30 of the downstream and all the panel groups by which tiling was carried out help to have the same panel ID. By the panel 30 by which the above-mentioned tile last bit is set as "1", the command from a host 10 is blocked like the case where tiling has not been carried out. In drawing 9, tiling of Panel C and the panel D is carried out, and attribute information is offered as a representative of the virtual panel by which tiling of the panel C was carried out. The attribute information as a virtual panel by which tiling was carried out in addition to the attribute as a simple substance panel is included in this attribute information. The setting command of Panel ID will act on Panels C and D in common, and will have the same ID. Consequently, as shown in drawing 10, the same panel ID "3" is set up by Panels C and D.

[0050] Next, when read-out of setting information is tried and "0" is not able to be read, it means reading the setting information on all the panels 30. [ 1-bit ] That is, in drawing 10, since a panel 30 does not exist in the downstream of Panel D, "0" can be read as a host 10. [ 1-bit ] As a background which can perform read-out in all the panels 30 by such approach, as mentioned above, the DDC terminal which is not connected is in the point of always continuing inputting "1" by the pull-up resistor. That is, it becomes the proof of the panel 30 connected there existing that "0" is inputted. When a panel 30 is investigated in round robin, according to this configuration, it becomes possible to requiring an immense number and time amount to read the connected panel 30 by very few efforts.

[0051] In the above, although display information read-out is made according to the explained contents, the flow of processing is again explained using the flow chart shown in drawing 11 in the sense of a check. With the gestalt of this operation, first, immediately after powering on, all the panels 30 have panel ID:0 (step 101), and prepare for read-out of setting information (step 102). When there is read-out of setting information, processing after it changes according to the condition of Panel ID (step 103). That is, when Panel ID is "0", the condition of a tile last bit is supervised (step 104). "Y, i.e., a tile last bit," acts so that a command may be blocked and a command may not be told to a lower stream of a river, since it is the panel of the last of the panel group by which tiling was carried out when set as "1" (step 105), and the tile last shifts to a setup of the panel ID in step 109.

[0052] When "N, i.e., a tile last bit," is set as "0" for the tile last at step 104, a command is passed further in a down-stream port (panel 30) (step 106). Next, it is judged whether it is the tile master of the panel group to which tiling of the panel 30 of the lower stream of a river where the command was passed was carried out (step 107). "N, i.e., a tile master bit," shifts to a setup of the panel ID in step 109, when a tile master is "0." On the other hand, a tile master sends out the setting information which consists of attribute information to a host 10, when "Y, i.e., a tile master bit," is "1" (step 108). Then, waiting (step 109) and Panel ID are set up (step 110), and a series of processings end a setup of Panel ID.

[0053] On the other hand, at step 103, when Panel ID is except "0 (!= "0")", a command is passed to a down-stream port (panel 30) (step 111). For the plug-and-play functional check mentioned later, the OR of the data from a down-stream port is transmitted to the upstream (step 112), and the port which inputted "0" first is set as a priority port (step 113). Next, discharge of waiting (step 114) and a priority port is carried out (step 115), and a series of processings end a setup of Panel ID.

[0054] As explained above, it is not necessary to fix from the beginning and, according to read-out of the display information in the gestalt of this operation, Panel ID can be changed dynamically behind, for example. That is, while being able to give Panel ID freely behind, the location of the panel ID and a corresponding panel etc. becomes possible [ recognizing with the read attribute ]. Moreover, when it constitutes so that it may explore by the host side in round robin, an immense number of verification is needed depending on the connectable number of panels, and huge verification time amount is needed. According to the gestalt of this operation, read-out of panel ID grant dynamic by the minimum effort and its display information becomes possible.

[0055] Next, the plug-and-play function in the gestalt of this operation is explained. If operation of a display is started after ending a setup, a host 10 publishes a command periodically, and he consists of gestalten of this operation so that the new panel 30 may not be added, the panel 30 may not be removed or \*\* may be checked. For this reason, the panel 30 was specified and the command for checking that operation is under continuation is published via DDC. The specified panel 30 sets to "0" the bit which shows an active thing, for example, and replies to read-out. Moreover, the panel 30 which is not specified shall only pour the read-out data from a lower stream of a river to the upstream. however -- since the number of the specified panels 30 is one -- the above -- the bit which shows an active thing has taken and transmitted the OR of the information in two or more downstream panels 30. That is, if the input from one of the downstream is "0", it constitutes so that "0" may be sent to the upstream. Moreover, suppose that the bit which can be used for another bit of the data transmitted to coincidence in order that the newly added panel 30 may notify it is prepared. It shall be transmitted while this bit also takes an OR by each panel 30. Since the command which investigates that a panel 30 is active was published periodically, it was presupposed to the panel 30 by which is the timing and the additional panel was carried out that a host 10 is answered by sending out "0" to the location of the bit which shows it.

[0056] Drawing 12 shows the example of a format for realizing this plug-and-play function. In this drawing, Panel ID (Panel-ID) is a command used in order to specify the panel ID which serves as a read-out object from a host 10 at the time of the transfer to a panel 30. Moreover, a panel error (Panel Error) is a command which shows various kinds of panel error information at the time of the transfer to a host 10 from a panel 30. Moreover, it has the panel power (Panel Power) command, the lateral-parity (Vertical Parity) command which shows lateral-parity information at the time of the transfer to a host 10 from a panel 30. This panel power (Panel Power) is a command used in case a panel actuation situation is transmitted to a host 10. It can be shown by setting this bit to "0" and returning to a host 10 using the bit (bit1) of Panel Available in the command of this panel power, that the specified panel 30 is not cut. Moreover, when the newly added panel 30 exists, a host 10 becomes possible [ recognizing existence of an additional panel ] by the added panel 30 setting the bit (bit3) of Panel Attached to "0", and transmitting to a host 10.

[0057] Thus, according to the plug-and-play function in the gestalt of this operation, it becomes



possible to detect an additional panel and a deletion panel, without using a dedicated line. That is, although connection of the display unit in the condition of having operated the system, and the processing at the time of cutting were usually called plug and play and a plug & display and the detection line of dedication was needed, according to the gestalt of this operation, it is possible to attain these functions using the control line used for other control.

[0058] Next, the example of the application using the gestalt of this operation is explained using drawing 13 and drawing 14. Drawing 13 shall show the example of the application which covered with nine panels 30, and tiling of the four panels 30 which were able to assign panel ID:1 shall be carried out. The number which four panels 30 which were able to assign this panel ID:1 followed [ - / (1999 1999) / (0 0) ] is set up as processing space. In this example, the window space which panel ID:1 is set up so that window ID:1 may be processed, for example, the applications A, such as a graph of a stock price, output is displayed.

[0059] On the other hand, as for panel ID:2- panel ID:6, each is treated as a panel of a simple substance. The panel of these simple substances is equipped with the processing space started from each (0 0). Here, if it is set as all of panel ID:2- panel ID:6 so that window ID:2 may be processed, the space which Application B outputs will be displayed on them by coincidence to all panel ID:2- panel ID:6. On the other hand, the handler of panel ID:2- panel ID:6 is controlled, and if it sets up as window ID:2 processed only in panel ID:2, only panel ID:2 will display the image of Application B. Subsequently, if it sets up for example, as window ID:2 processed in panel ID:3, it will become possible to display the image of Application B on panel ID:3. Thus, it becomes possible to display different images (for example, stock price for every brand etc.) one after another on panel ID:2- panel ID:6.

[0060] Like [ drawing 14 ] drawing 13, although it has covered with nine panels 30, drawing 13 differs from processing space. That is, for example, at panel ID:2, it is - (2999 999) (2000 0), In panel ID:4, it is set up so that it may become a continuous number including the panel ID which adjoins [ - / (999 2999) ] (0 2000). Consequently, although the display which consists of nine panels 30 has four panel by which tiling was carried out 30 group, and five panels 30 of a simple substance, it is devising a setup of such processing space, and becomes possible [ performing the display which continued using all nine panels 30 ]. The window ID shown in drawing 14 by this: If it directs to process 3 on all the panels ID, the image of Application C will be displayed using all the panels 30, as shown in drawing 14.

[0061] In addition, by the above explanation, when tiling etc. carries out the panel 30 of a simple substance and it considers as one panel 30 for convenience, the case where pack the panel 30 of a simple substance and a multi-panel is constituted has been explained. However, this invention is not limited to this mode and can also assume this sub panel to be the panel 30 of the simple substance in the gestalt of operation supposing the sub panel which divided the highly minute panel into plurality. For example, in the example of application by nine panels 30 explained by drawing 13 and drawing 14, it will become one highly minute panel by the nine panel 30 whole, and the sub panel in this highly minute panel will correspond to each panel 30. What is necessary is to equip each sub panel with Panel ID in this case, and just to perform the same display action to it based on the directions from a host 10. However, when dividing one highly minute panel into a sub panel, it is also possible to constitute so that it can respond by it not being necessary to necessarily have the nonvolatile memory 32 shown in drawing 1 for every sub panel for example, and having two or more processing chips 31 as one nonvolatile memory 32 and a drive.

[0062] As mentioned above, although the gestalt of this operation has been explained to a detail, it is most effective to apply the technique of making the processing about image display decentralizing by the host 10 and the panel 30 when attaining the technique adopted as these gestalten, and the technique of transmitting the data packet-ized between the host 10 and the panel 30. This technique made to decentralize equips a panel 30 side with the frame memory which it had in the host 10 side in the former, and what performs processing of expansion of an image, refresh, etc. by the panel 30 side is mentioned. Moreover, with the technique of transmitting the packet-ized data, the thing which each window has and which transmits an image scan signal for every field is mentioned. In this decentralization technique and a packet-ized transfer, it becomes possible by adopting the gestalt of this operation to define a window, a

panel, the information that should be managed on each level of a chip, and its processing. consequently — for example, it becomes possible to realize the drive reasonable, even if it is a high definition panel, and to constitute easily the multi-panel by the combination of many simple substance panels.

[0063] Next, other examples of application in the gestalt of this operation are explained. It is [ in / the transfer technique from the former which does not use a packet transfer ] possible to apply the gestalt of this operation also to the image data in the so-called native mode which transmits a full screen frequently, without carrying out the form of a packet. As a panel 30 side, it has the 1st function which displays a display image on the location of arbitration for the scale factor of arbitration by this native mode, and it is starting a transfer of the picture signal to a panel 30, or stopping as a host 10 side, and, more specifically, it becomes possible to display the FAIN image by division drawing also to a highly minute panel.

[0064] It sets to the so-called native mode, and a setup of resolution is made according to the capacity of PC by the side of a host 10. For example, they are VGA (Video Graphics Array) (640x480 dots) capacity, XGA (Extended Graphics Array) (1024x768 dots) capacity, etc. When displaying this on the high definition panel beyond the resolution capacity by the side of a host 10, it is common that a scaling, centering, etc. tend to be performed and it is going to display to a highly minute panel. However, the 1st above-mentioned function by the side of a panel 30 enables it to express the image in the mode in the location of the arbitration of a highly minute panel as the scale factor of arbitration conventionally by using the processor (handler) of the window in the gestalt of this operation introduced by packet transfer processing. Ride information, such as a display location and a scale factor, and it is not sent to a packet, but it is that this display technique differs from the image (EKUSU ten dead mode) of the packet base in the point set as the handler of a panel controller. It is possible to use the command via DDC explained by drawing 1 for this setup. That is, a multi-panel can be constituted via DDC, or using Panel ID, a command can be sent, the arrangement information in image space can be changed, and even if the video signal (picture signal) is not packet-ized, it becomes possible [ displaying on a multi-panel greatly ].

[0065] moreover, the 1st function by the side of this panel 30 -- in addition -- the 2nd function of the above -- for example, the super-high ones -- the case where the host 10 whose resolution of the image which can be outputted to a minute panel is not so high is connected -- the super-high one -- carrying out division drawing of the whole surface of a minute panel is assumed. For example, it is carrying out the step of the display position of an image horizontally from the upper left, and repeating a step toward the bottom from on a screen etc. A host 10 cannot but divide whether a picture signal shall be outputted with the degree of maximal solution image which self has, and if the resolution of a panel 30 is larger than a host's 10 resolution, it will expand, and cannot but send an image. Before moving at subsequent actuation in the case of which [ the ], a host 10 needs to stop sending out of an image by one screen exactly, after finishing sending. And the appropriate next display position is set up by the command via DDC, and it is constituted so that the output of a video signal may be resumed after that.

[0066] The highly minute panel which also sets to a native mode and exceeds the resolution of PC by the side of a host 10 by this the 1st function and 2nd function also becomes possible [ displaying a FAIN image by carrying out division drawing ]. Moreover, also in a native mode, it becomes possible to separate a panel 30, with an image displayed. Although this function is that a transfer of a packet stops and is automatically attained after an image transfer in above-mentioned EKUSU ten dead mode, it is realized in a native mode by the halt processing by the side of a host 10. After connecting to a host 10 the panel 30 which consists of magnitude of a postcard as an example of the application by this function, for example and outputting a photograph image, it may detach and may place as a photograph stand. Moreover, the panel of a super-high definition is hung on the wall, a masterpiece is displayed, and the application of \*\* many, such as rewriting by connecting PC, can be considered to change a picture.

[0067] In addition, although the gestalt of this operation has explained taking the case of a liquid crystal display (LCD) as a display, it cannot be overemphasized that it is applicable also in other displays, such as CRT, PDP, and LED. However, when performing an enlarged display combining

two or more panels 30, especially the display of LCD which is a narrow picture frame is desirable. Moreover, since the technological innovation in LCD is remarkable as a highly minute display, LCD is excellent, also when dividing one panel on the theory and managing as a sub panel.

[0068]

[Effect of the Invention] As explained above, according to this invention, also in the bottom of a multi-panel environment, the same operation by the number of connection panels (sub panel) can be performed. Moreover, with the conventional technique, multi-panel connection of the shape of a tree which was not able to be solved is made, and the re-layout of a dynamic panel (sub panel) is attained. Furthermore, it is in constituting a multi-panel from a system automatically, without reading a display attribute from a cascade or the multi-panel by which tree connection was made, and performing a setup special to each display unit. Furthermore, when carrying out division processing of the panel of a super-high definition with two or more drives, it is made visible as an indicating equipment of a simple substance, and the processing which is not conscious of a multi-panel is attained from a host again because the drive used as a master controls each drive.

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[Translation done.]

\* NOTICES \*

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

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## DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing 1 operation gestalt of the image display system by which this invention was applied.

[Drawing 2] It is drawing having shown the example of a configuration of two or more panels containing tiling.

[Drawing 3] It is drawing having shown the example of a setting of the control information (control parameter) at the time of constituting two or more panels including tiling.

[Drawing 4] It is drawing having shown the example of correspondence in the image space of a window ID and Panel ID.

[Drawing 5] It is an explanatory view for explaining the contents of the handler set in the panel 30.

[Drawing 6] It is an explanatory view for explaining packet mode of processing outputted to a panel 30 side from a host 10.

[Drawing 7] It is drawing for explaining a setup of Panel ID and the readout of configuration information by Panels A, B, C, and D in order of a step.

[Drawing 8] It is drawing for explaining a setup of Panel ID and the readout of configuration information by Panels A, B, C, and D in order of a step.

[Drawing 9] It is drawing for explaining a setup of Panel ID and the readout of configuration information by Panels A, B, C, and D in order of a step.

[Drawing 10] It is drawing for explaining a setup of Panel ID and the readout of configuration information by Panels A, B, C, and D in order of a step.

[Drawing 11] It is the flow chart which showed the flow of display information read-out

processing.

[Drawing 12] It is drawing having shown the example of a format for realizing a plug-and-play function.

[Drawing 13] It is drawing having shown the example of the application using the gestalt of this operation.

[Drawing 14] It is drawing having shown the example of the application using the gestalt of this operation.

[Description of Notations]

10 [ -- RAM, ] -- A host (Host), 11 -- CPU, 12 -- An I/O circuit, 13 15 -- A display-control circuit, 21 -- The panel ID setup instruction section, 22 -- Panel ID recognition section, 23 -- The panel attribute setting section, 24 -- The control signal output section, 25 -- Window ID allocation section, 26 [ -- Processing chip, ] -- The picture signal transfer section, 27 -- The image generation section, 30 -- A panel, 31 32 [ -- Tile (Tiled) bit, ] -- Nonvolatile memory, 33 -- A receiver, 34 -- A driver, 41 42 -- A tile master (TiledMaster) bit, 43 -- Tile last (TileLast) bit, 44 [ -- A window, 61 / -- The 1st handler, 62 / -- The 2nd handler ] -- A multi-KONFU (MultiConf) bit, 45 -- Panel ID, 50 -- 51 The image space of a system, 52

[Translation done.]

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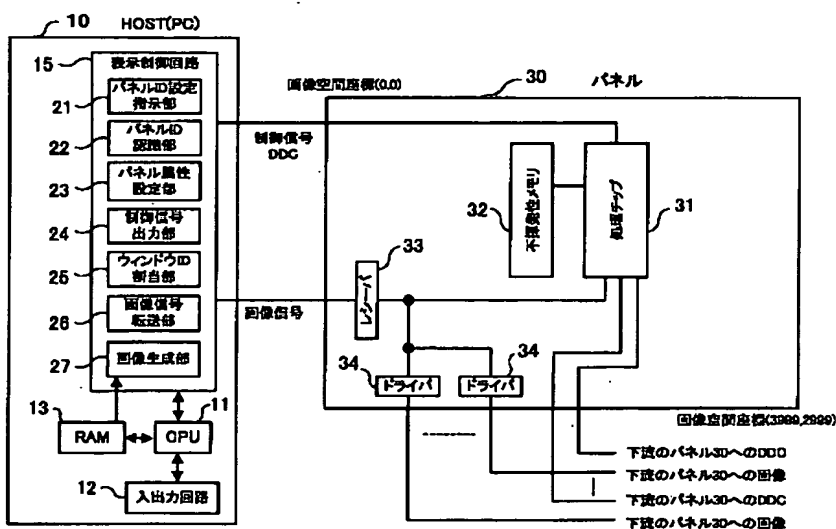
1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\* shows the word which can not be translated.

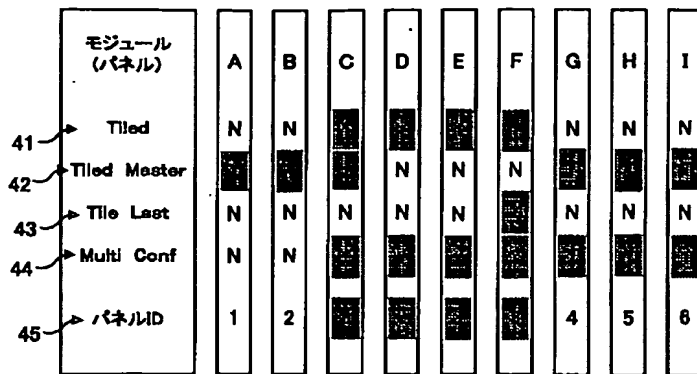
3.In the drawings, any words are not translated.

## DRAWINGS

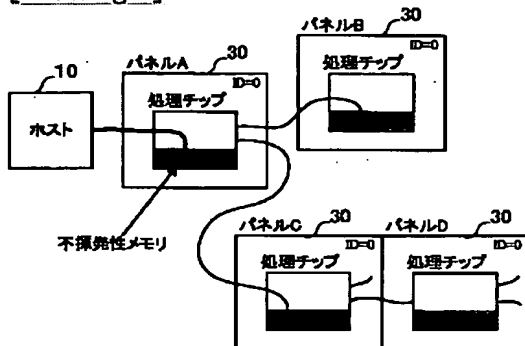
[Drawing 1]



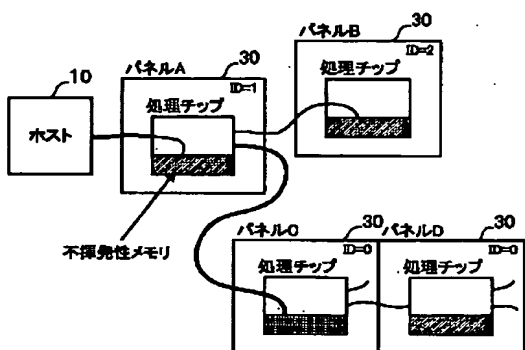
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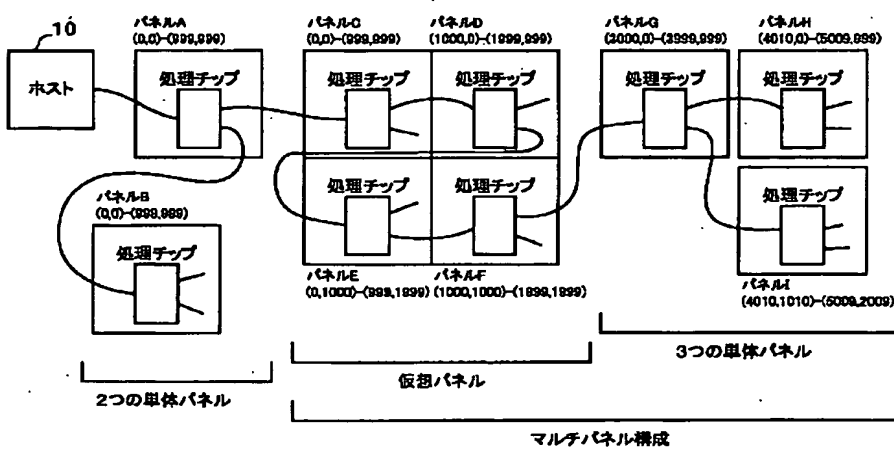
[Drawing 7]



[Drawing 9]

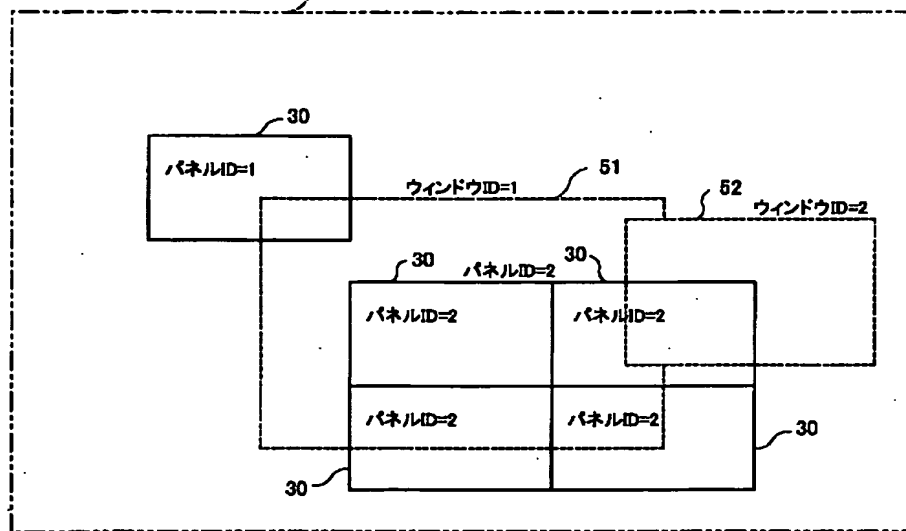


[Drawing 2]



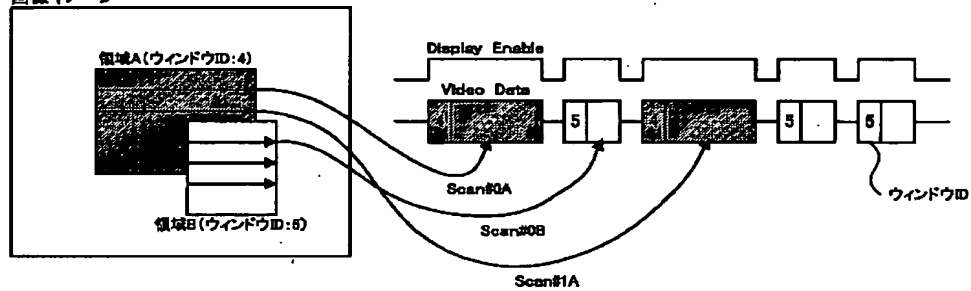
[Drawing 4]

システムの画像空間

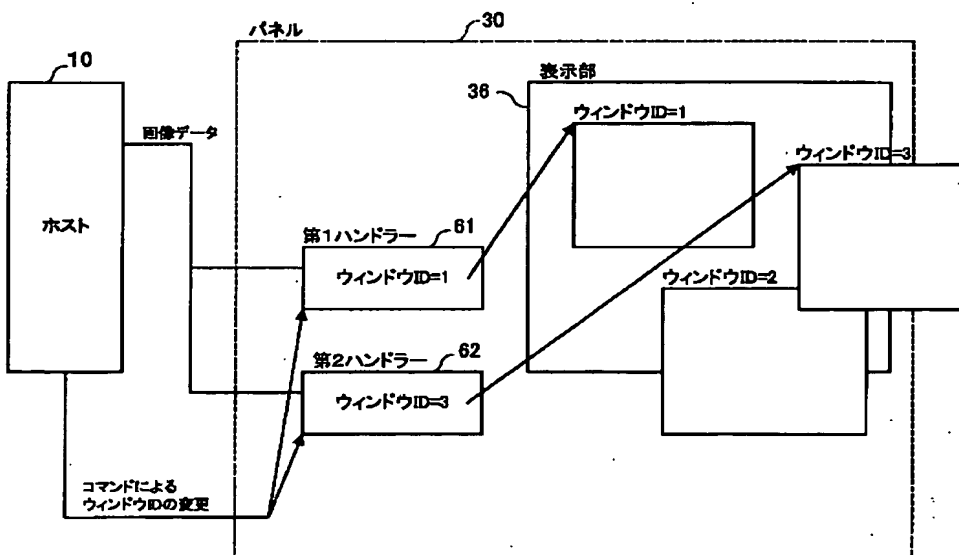


[Drawing 6]

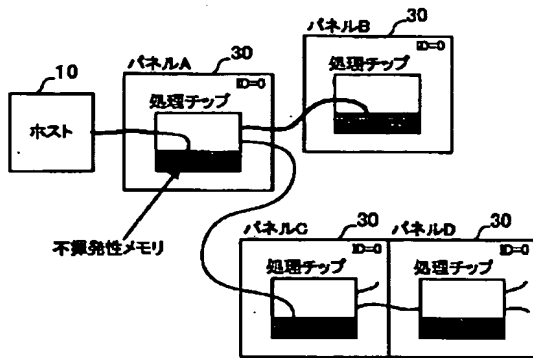
画像イメージ



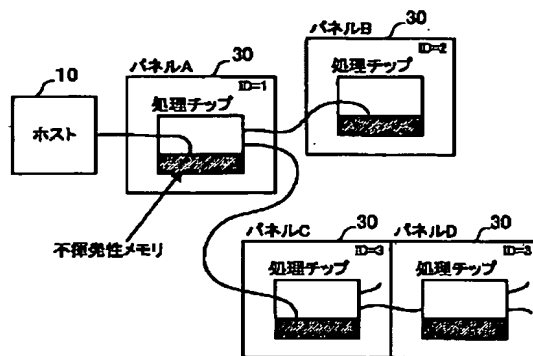
[Drawing 5]



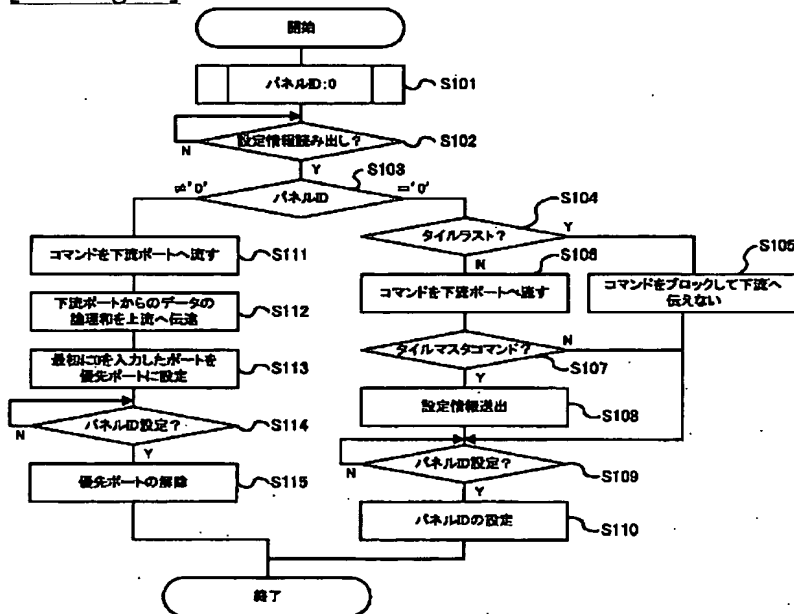
[Drawing 8]



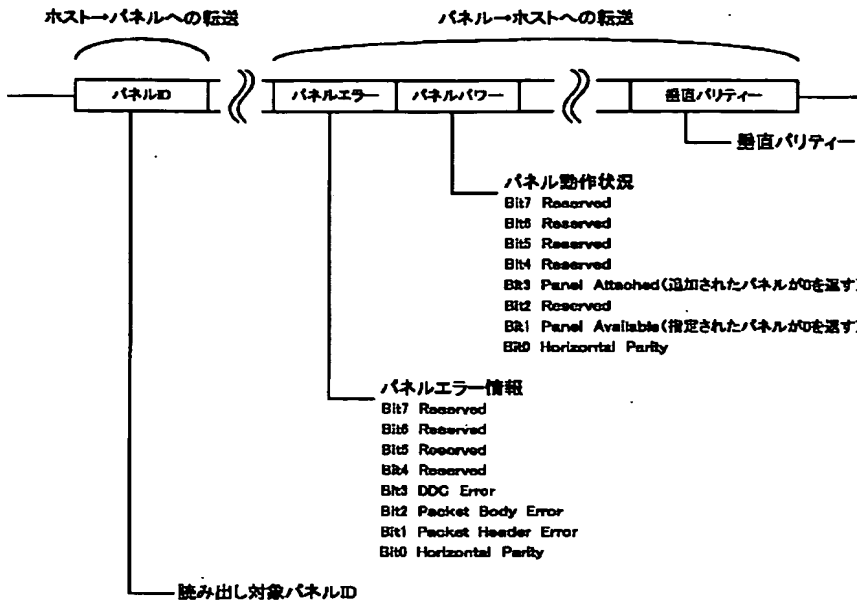
[Drawing 10]



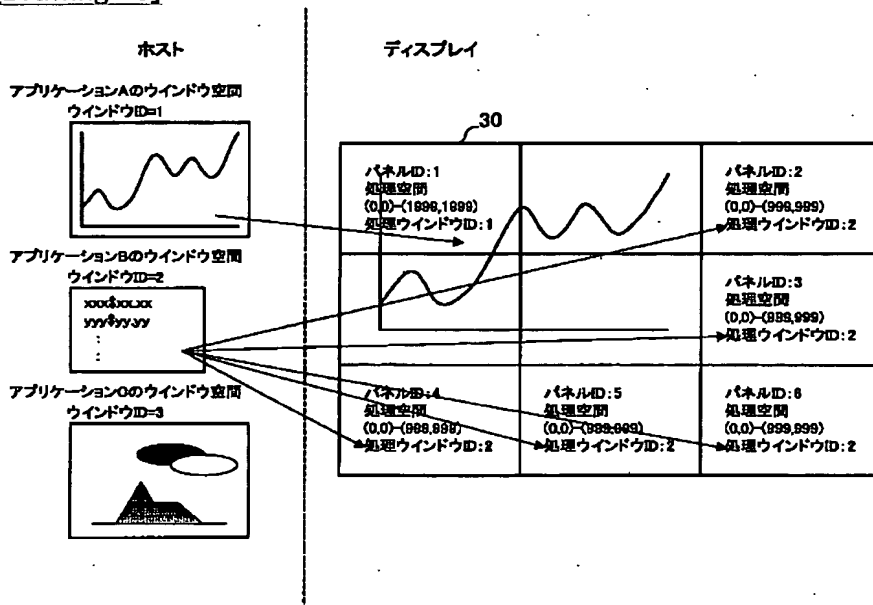
[Drawing 11]



[Drawing 12]

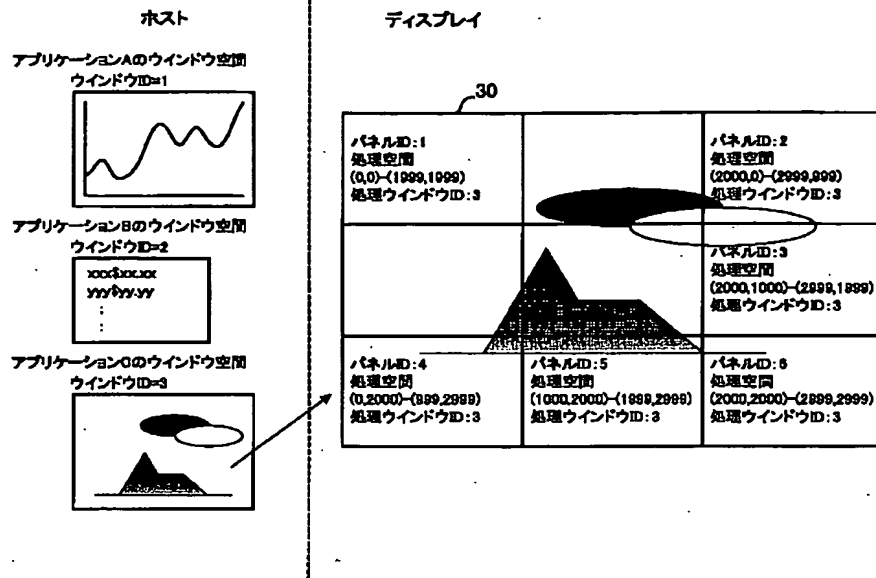


[Drawing 13]



[Drawing 14]





[Translation done.]